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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MICHAEL A. VYVODA, N. JOHAN KNALL and
JAMES M. CLEEVES

Appeal 2008-005848
Application 09/918,853[1]
Technology Center 2800

Decided: November 25, 2009

Before MAHSHID D. SAADAT, SCOTT R. BOALICK, and
JOHN A. JEFFERY, *Administrative Patent Judges*.

BOALICK, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] Application filed July 30, 2001. The real party in interest is Matrix Semiconductor, Inc.

This is an appeal under 35 U.S.C. § 134(a) from the final rejection of claims 1-24, 35-40, and 55-153.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

STATEMENT OF THE CASE

Appellants' invention relates to plasma oxidation processes for fabricating dielectric films such as, for example, a silicon oxide film, in semiconductor devices. (Spec. 1:13-15; 6:14-16.)

Claims 1, 35, 72, and 113 are exemplary (with disputed limitations emphasized):

> 1. A plasma oxidation process comprising:
> *exposing an oxidizable surface to an oxidizing plasma*,
> wherein the oxidizing plasma has an activity relative to the oxidizable surface;
> forming an oxide film on the oxidizable surface; and
> *regulating the oxidizing plasma activity to limit a rate of formation of the oxide film.*
>
> 35. A process for forming an antifuse comprising:
> *exposing an oxidizable surface to an plasma oxidation process for an initial exposure time*; and
> growing an oxide film on the oxidizable surface, and
> *wherein the oxide film grows to a predetermined thickness at an end of the initial exposure time, and wherein additional exposure to the plasma oxidation process beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film.*

[2] Claims 25-34 and 41-54 have been withdrawn.

72. A plasma oxidation process comprising:
exposing an oxidizable surface to an oxidizing plasma,
wherein the oxidizing plasma has an activity relative to the oxidizable surface;
forming an oxide film on the oxidizable surface; and
regulating the oxidizing plasma activity to limit a rate of formation of the oxide film by regulating at least one of the following: reaction kinetics, growth initiation, and surface energy.

113. A plasma oxidation process comprising:
exposing an oxidizable surface to an oxidizing plasma,
wherein the oxidizing plasma has an activity relative to the oxidizable surface;
forming an oxide film on the oxidizable surface; and
regulating the oxidizing plasma activity to limit a rate of formation of the oxide film to a predetermined growth rate while the oxidizable surface is being exposed to the oxidizing plasma.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Denison	5,869,149	Feb. 9, 1999
Chung	5,930,650	July 27, 1999
Kwan	6,335,288 B1	Jan. 1, 2002 (filed Aug. 24, 2000)
Kawakami	6,399,520 B1	June 4, 2002 (filed Mar. 9, 2000)
Moon	2002/0137266 A1	Sept. 26, 2002 (filed May 15, 2000)
Thomas	6,509,283 B1	Jan. 21, 2003 (filed May 13, 1998)
Cleeves	6,541,312 B2	Apr. 1, 2003 (filed Dec. 22, 2000)

Claims 113-117, 119, 122-124, 126, 128, 130-132, 134-140, 142-145, and 147-153 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Thomas.

Claims 118, 121, 125, and 129 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Kwan.

Claim 120 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Denison.

Claims 127 and 141 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Cleeves.

Claim 146 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Kawakami.

Claim 133 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas.

Claims 1-5, 7, 10-12, 14, 16, 18-20, 22-24, 35, 38-40, 55-58, 60-63, and 65-71 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Moon.

Claims 6, 9, 13, 17, and 37 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Moon, and Kwan.

Claims 8 and 36 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Moon, and Denison.

Claims 15 and 59 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Moon, and Cleeves.

Claim 64 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Moon, and Kawakami.

Claim 21 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Moon.

Claims 72-76, 78, 81-83, 85, 87, 89-91, 93-99, 101-104, and 106-112 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Chung.

Claims 77, 80, 84, and 88 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Chung, and Kwan.

Claim 79 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Chung, and Denison.

Claims 86 and 100 stand rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Chung, and Cleeves.

Claim 105 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas, Chung, and Kawakami.

Claim 92 stands rejected under 35 U.S.C. § 103(a) as being obvious over Thomas and Chung.

Except as noted in this decision, Appellants have not presented any substantive arguments directed separately to the patentability of the dependent claims or related claims in each group. In the absence of a separate argument with respect to those claims, they stand or fall with the representative independent claim. *See* 37 C.F.R. § 41.37(c)(1)(vii). Only those arguments actually made by Appellants have been considered in this decision. Arguments that Appellants did not make in the Briefs have not been considered and are deemed to be waived. *See id.*

ISSUES

§ 102(e) Rejection - Thomas

Appellants argue that Thomas does not teach plasma oxidation (App. Br. 9-11; Reply Br. 2-5) and does not teach regulating plasma activity to limit a rate of formation of the oxide film to a predetermined growth rate (App. Br. 11-12; Reply Br. 5), as recited by independent claim 113. Independent claims 130, 137, 144, and 149 recite similar limitations.

Appellants' arguments present the following issues:

1. Have Appellants shown that the Examiner erred in finding that Thomas teaches exposing an oxidizable surface to an oxidizing plasma?

2. Have Appellants shown that the Examiner erred in finding that Thomas teaches regulating the oxidizing plasma activity to limit a rate of formation of the oxide film to a predetermined growth rate while the oxidizable surface is being exposed to the oxidizing plasma?

§ 103 Rejection - Thomas / Moon

Appellants argue that Thomas and Moon do not teach or suggest a plasma oxidation process that includes exposing an oxidizable surface to an oxidizing plasma (App. Br. 12-13), as recited by independent claim 1. Independent claims 18, 35, 55, 62, and 67 recite similar limitations. Appellants also argue that Thomas and Moon do not teach or suggest regulating the oxidizing plasma activity to limit a rate of formation of the oxide film (App. Br. 13-15), as recited by independent claim 1. Independent claims 18, 55, 62, and 67 recite similar limitations.

With respect to independent claim 35, Appellants further argue that Thomas and Moon do not teach or suggest a process where the oxide film

grows to a predetermined thickness at an end of the initial exposure time, and where additional exposure to the plasma oxidation process beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film (App. Br. 14-15). In particular, Appellants argue that the oxide thickness teachings of Moon are not relevant to Thomas because the oxidation process of Moon takes place in air at room temperature rather than in the high temperature atomic oxygen atmosphere of Thomas. (App. Br. 14.)

Appellants' arguments present the following issues:

1. Have Appellants shown that the Examiner erred in finding that Thomas and Moon teach or suggest exposing an oxidizable surface to an oxidizing plasma?

2. Have Appellants shown that the Examiner erred in finding that Thomas and Moon teach or suggest regulating the oxidizing plasma activity to limit a rate of formation of the oxide film?

3. Have Appellants shown that the Examiner erred in finding that Thomas and Moon teach or suggest a process where the oxide film grows to a predetermined thickness at an end of the initial exposure time, and where additional exposure to the plasma oxidation process beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film?

§ 103 Rejection - Thomas / Chung

Appellants argue that Thomas and Chung do not teach or suggest regulating the oxidizing plasma activity to limit a rate of formation of the oxide film by regulating at least one of the following: reaction kinetics,

growth initiation, and surface energy, as recited by independent claim 72. (App. Br. 16.) Independent claims 89, 96, 103, and 108 recite similar limitations. In particular, Appellants argue that the Examiner erred in combining the teachings of Thomas and Chung because Chung is directed to an etch process (i.e., a process which removes an oxide) whereas Thomas is directed to an oxidation process (i.e., a process which grows an oxide). (App. Br. 16.)

Appellants' arguments present the following issues:

1. Have Appellants shown that the Examiner erred in finding that Thomas and Chung teach or suggest regulating the oxidizing plasma activity to limit a rate of formation of the oxide film by regulating at least one of the following: reaction kinetics, growth initiation, and surface energy?

2. Have Appellants shown that the Examiner erred by improperly combining Thomas and Chung?

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Appellants describe plasma oxidation processes for fabricating dielectric films in semiconductor devices. (Spec. 1:13-15.) The Specification teaches that

> a silicon oxide layer is grown on the upper surface of a semiconductor layer at a precisely controlled oxidation rate. . . . The oxidation rate control is provided by one or more methods to regulate the plasma activity at the surface of the semiconductor layer. The term "plasma activity" as used herein is intended to encompass any

> aspect of the plasma oxidation process, including but not limited to, reaction kinetics, growth initiation, surface energy and the like. Accordingly, the methods of the invention include both surface conditioning prior to presenting an oxidizable surface to the oxidizing plasma and adjustment of plasma gases and operating conditions before or during plasma oxidation, or both.

(Spec. 6:14-25.)

2. The Specification teaches that "[p]recise control of the oxidation rate can be attained by adjusting the composition of the oxidizing plasma" (Spec. 7:18-19; *see also* Spec. 7:20-29). For example, an inert gas can be used to dilute the plasma and control the growth rate of the oxide film. (Spec. 7:20-29.) The Specification also teaches that the thickness of the oxide layer can be controlled by a self-limiting mechanism where the growth of the oxide layer is self-limited to a predetermined thickness. (Spec. 7:30 to 8:6.) "One means of establishing a self-limiting mechanism is by controlling the temperature of the oxidizable surface." (Spec. 8:23-24.)

3. Thomas describes a method using atomic oxygen for thermally oxidizing silicon to form a layer of silicon dioxide. (Abstract.) The atomic oxygen, denoted as O^-, in one embodiment may be generated within the oxidation furnace 20 by passing the gas through a heated ceramic material 24 (Abstract; col. 2, l. 34 to col. 3, l. 20; Fig. 2) or, in another embodiment, may be generated at a remote source, such as a plasma reactor 60, and then introduced into the oxidation furnace 52 (Abstract; col. 3, ll. 21-51; Fig. 3.)

4. In a first embodiment, Thomas describes placing a silicon substrate in a "fast ramp furnace" 20, introducing an inert gas into the furnace, and pre-heating to a first temperature, such as 500°C. (Col. 2, ll. 34-44.) Atomic oxygen, shown as O^- (Fig. 2; col. 3, l. 8), is then generated by passing oxygen gas through a ceramic material and, simultaneous with the introduction of oxygen, the ceramic material is heated to a second temperature, such as 1000°C. (Col. 2, ll. 45-52.) The atomic oxygen reacts with the silicon substrate to form a layer of silicon dioxide on the surface of the substrate. (Col. 2, ll. 52-55.) The fast ramp furnace 22 has a port 28 to introduce the inert gas and has heating elements 24 that are controlled to provide a temperature ramp of 100°C per minute or greater. (Col. 3, ll. 11-14.)

5. In another embodiment, Thomas describes the use of "a remote source of atomic oxygen, such as a conventional plasma generator [60]" (col. 3, ll. 23-24) which "generates a flow 62 of atomic oxygen (or O^- $+N^-$) which is provided to the vessel 54" (col. 3, ll. 32-33). "The furnace heats the wafers 58 to a temperature suitable for reaction of the silicon and atomic oxygen (or O^-+N^-) to form silicon dioxide" (col. 3, ll. 33-36).

6. Moon describes a low temperature process for fabricating thin film transistors. (Abstract; ¶ [0002].) The processes of Moon generally take place at temperatures under 400°C. (¶¶ [0004], [0018], [0033].) Figure 6 is a graph that shows the thickness of a silicon oxide layer "formed in normal air" at various exposure times. (¶¶ [0029], [0031].)

Moon teaches that high temperature, such as 300°C, can elevate the diffusion of oxygen into the silicon layer. (¶ [0033].)

7. Chung describes a method of wet etching silicon material. (Abstract; col. 1, ll. 6-8.) The method of Chung "offers an advantage of a relatively slow silicon oxide etch rate, such that any oxide material that is present is not significantly removed during the etching of the silicon materials." (Col. 2, ll. 22-25.)

PRINCIPLES OF LAW

Anticipation is established when a single prior art reference discloses, expressly or under the principles of inherency, each and every limitation of the claimed invention. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79 (Fed. Cir. 1994).

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). Obviousness rejections can be based on references that happen to anticipate the claimed subject matter. *See In re Meyer*, 599 F.2d 1026, 1031 (CCPA 1979).

"[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of

obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). "To facilitate review, this analysis should be made explicit." *KSR*, 550 U.S. at 418.

During examination of a patent application, a claim is given its broadest reasonable construction consistent with the specification. *In re Prater*, 415 F.2d 1393, 1404-05 (CCPA 1969). "[T]he words of a claim 'are generally given their ordinary and customary meaning.'" *Phillips v. AWH Corp.,* 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (internal citations omitted). The "ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1313.

ANALYSIS

§ 102(e) Rejection - Thomas

Appellants' argument that the Examiner erred in rejecting independent claims 113, 130, 137, 144, and 149 as being anticipated by Thomas is persuasive. Although we agree with the Examiner that Thomas teaches exposing an oxidizable surface to an oxidizing plasma, Appellants have shown that the Examiner erred in finding that Thomas teaches regulating the oxidizing plasma activity to limit a rate of formation of the oxide film to a *predetermined growth rate* while the oxidizable surface is being exposed to the oxidizing plasma.

As the Examiner correctly found (Ans. 3, 35-36), Thomas teaches exposing an oxidizable surface to an oxidizing plasma. (*See* FF 3-5.) Appellants state that a plasma is an ionized gas. (Reply Br. 2.) Thomas

teaches that atomic oxygen (O^-) can be generated in the oxidation furnace 20 by heating a ceramic material to a second temperature such as 1000°C (FF 3, 4) or can be generated at a remote source such as a plasma reactor 60 (FF 3, 5). In both embodiments, Thomas teaches introducing an ionized gas of atomic oxygen (O^-) (i.e., a plasma) into the furnace and exposing it to silicon in order to form a layer of silicon dioxide. (FF 3-5.)

Appellants' arguments (App. Br. 9-11; Reply Br. 2-5) fail to demonstrate error in the Examiner's finding that Thomas teaches exposing an oxidizable surface to an oxidizing plasma. While Appellants are correct that Thomas specifically describes a process for *thermal* oxidation (App. Br. 9; Reply Br. 4-5), the claims are not written in a manner that excludes thermal oxidation. Instead, the claims merely require that an oxidizable surface be exposed to an oxidizing plasma -- which Thomas teaches. Appellants' arguments regarding specific furnace operating temperatures (App. Br. 9-10) are directed to unclaimed limitations. In addition, given Appellants' definition of a plasma as an ionized gas, we are not convinced by Appellants' arguments that the atomic oxygen (O^-) taught by Thomas is not the same as an oxygen plasma (App. Br. 11; Reply Br. 2-5).

However, we agree with Appellants (App. Br. 12) that the Examiner erred in finding that Thomas teaches regulating the oxidizing plasma activity to limit a rate of formation of the oxide film to a *predetermined growth rate* while the oxidizable surface is being exposed to the oxidizing plasma, as claimed.

The Examiner correctly found (Ans. 4, 36) that Thomas teaches regulating the oxidizing plasma activity to limit a rate of formation of the oxide film. (*See* FF 3-5.) The Specification explains that "plasma activity"

is a broad term that "is intended to encompass any aspect of the plasma oxidation process" (FF 1), that precise control of the oxidation rate can be achieved by adjusting the composition of the oxidizing plasma and an inert gas (FF 2), and that a self-limiting mechanism can be established by controlling the temperature of the oxidizable surface (FF 2). Thus, by teaching that the composition of atomic oxygen (i.e., plasma) and inert gas is adjusted (FF 4) and that the temperature of the silicon substrate is controlled (FF 4), Thomas teaches regulating the oxidizing plasma activity to limit a rate of formation of the oxide film. But the Examiner does not explain, and we do not find, where Thomas teaches regulating the plasma activity to limit a rate of formation of the oxide film to a *predetermined growth rate*.

Therefore, Appellants have shown that the Examiner erred in finding that Thomas teaches regulating the oxidizing plasma activity to limit a rate of formation of the oxide film to a *predetermined growth rate* while the oxidizable surface is being exposed to the oxidizing plasma.

Accordingly, we conclude that Appellants have shown that the Examiner erred in rejecting independent claims 113, 130, 137, 144, and 149, as well as dependent claims 114-117, 119, 122-124, 126, 128, 131, 132, 134-136, 138-140, 142, 143, 145, 147, 148, and 150-153 under 35 U.S.C. § 102(e).

For similar reasons, we conclude that Appellants have shown that the Examiner erred in rejecting dependent claims 118, 120, 121, 125, 127, 129, 133, 141, and 146 as being obvious over various combinations of Thomas, Kwan, Dennison, Cleeves, and Kawakami. The Examiner has not shown that Kwan, Dennison, Cleeves, or Kawakami remedies the above-noted deficiencies of Thomas.

§ 103 Rejection - Thomas / Moon

Appellants' argument that the Examiner erred in rejecting independent claims 1, 18, 55, 62, and 67 as being obvious over Thomas and Moon is not persuasive.

As previously discussed with respect to the anticipation rejection, Thomas teaches both exposing an oxidizable surface to an oxidizing plasma and regulating the oxidizing plasma activity to limit a rate of formation of the oxide film, as claimed. The Examiner cited Moon for teaching the limitation "wherein the oxide film grows to a predetermined thickness at an end of an initial exposure time." This limitation is recited by independent claim 35 but is not recited by independent claims 1, 18, 55, 62, or 67. However, it is well established that obviousness rejections can be based on references that happen to anticipate the claimed subject matter. *See Meyer*, 599 F.2d at 1031.

Accordingly, we conclude that Appellants have not shown that the Examiner erred in rejecting independent claims 1, 18, 55, 62, and 67 under 35 U.S.C. § 103(a). Dependent claims 2-5, 7, 10-12, 14, 16, 19, 20, 22-24, 56-58, 60, 61, 63, 65, 66, and 68-71 were not argued separately, and fall together with claims 1, 18, 55, 62, and 67, from which they depend.

Appellants have not addressed the rejection of dependent claims 6, 8, 9, 13, 15, 17, 21, 59, and 64 over various combinations of Thomas, Moon, Kwan, Denison, Cleeves, and Kawakami. Therefore, we summarily sustain these rejections.

However, Appellants' argument that the Examiner erred in rejecting independent claim 35 as being obvious over Thomas and Moon is persuasive. We agree with Appellants that the Examiner erred in combining

the disclosures of Thomas and Moon. Moon describes a low temperature process that generally takes place at temperatures under 400˚C, as compared to the process of Thomas which takes place at or above 500˚C. (FF 4, 6.) In addition, Figure 6 of Moon, relied upon by the Examiner (Ans. 13, 16), shows the thickness of a silicon oxide layer "formed in normal air" (FF 6) rather than in an atomic oxygen atmosphere similar to Thomas. The Examiner has not articulated a reason with some rational underpinning to explain how or why one of ordinary skill in the art would apply the low temperature "normal air" teachings of Moon (*see* FF 6) to the higher temperature atomic oxygen environment of Thomas (*see* FF 3-5) to meet the claimed limitation of "wherein the oxide film grows to a predetermined thickness at an end of the initial exposure time, and wherein additional exposure to the plasma oxidation process beyond the initial exposure time does not result in a significant further increase in thickness of the oxide film."

Therefore, we conclude that Appellants have shown that the Examiner erred in rejecting claim 35, as well as claims 38-40 which depend from claim 35.

For similar reasons, we conclude that Appellants have shown that the Examiner erred in rejecting claim 36 as being obvious over Thomas, Moon, and Dennison, and erred in rejecting claim 37 as being obvious over Thomas, Moon, and Kwan. The Examiner has not shown that Kwan or Dennison remedy the above-noted deficiencies of Thomas and Moon.

§ 103 Rejection - Thomas / Chung

Appellants' argument that the Examiner erred in rejecting independent claims 72, 89, 96, 103, and 108 as being obvious over Thomas and Chung is persuasive. In particular, we agree with Appellants that the Examiner erred in combining the teachings of Thomas and Chung.

The Examiner found that "Thomas does not disclose regulating at least one of the following: reaction kinetics, growth initiation, and surface energy" (Ans. 25) but found that Chung "discloses that reaction kinetics is a process variable of a reaction process" (Ans. 25). However, Chung is directed to a method for wet etching a silicon material and teaches techniques for a "relatively slow silicon oxide etch rate." (FF 7.) Since Chung teaches the etching (i.e., removal) of silicon dioxide rather than the growth of silicon dioxide, we fail to see how Chung is relevant to the claimed limitation of regulating the oxidizing plasma activity to limit a rate of formation of the oxide film by regulating at least one of the following: reaction kinetics, growth initiation, and surface energy. The Examiner has not articulated a reason with some rational underpinning to support the proposed combination of Thomas and Chung.

Therefore, we conclude that Appellants have shown that the Examiner erred in rejecting independent claims 72, 89, 96, 103, and 108 as well as dependent claims 73-76, 78, 81-83, 85, 87, 90, 91, 93-95, 97-99, 101, 102, 104, 106, 107, and 109-112 under 35 U.S.C. § 103.

For similar reasons, we conclude that Appellants have shown that the Examiner erred in rejecting claims 77, 79, 80, 84, 86, 88, 92, 100, and 105 as being obvious over various combinations of Thomas, Kwan, Dennison, Cleeves, and Kawakami. The Examiner has not shown that Kwan,

Dennison, Cleeves, or Kawakami remedies the above-noted deficiencies of Thomas and Chung.

CONCLUSION

Based on the findings of fact and analysis above, we conclude that:

(1) Appellants have shown that the Examiner erred in rejecting claims 113-117, 119, 122-124, 126, 128, 130-132, 134-140, 142-145, and 147-153 under 35 U.S.C. § 102(e).

(2) Appellants have not shown that the Examiner erred in rejecting claims 1-24 and 55-71 under 35 U.S.C. § 103(a).

(3) Appellants have shown that the Examiner erred in rejecting claims 35-40, 72-112, 118, 120, 121, 125, 127, 129, 133, 141, and 146 under 35 U.S.C. § 103(a).

DECISION

The rejection of claims 113-117, 119, 122-124, 126, 128, 130-132, 134-140, 142-145, and 147-153 under 35 U.S.C. § 102(e) is reversed.

The rejection of claims 1-24 and 55-71 under 35 U.S.C. § 103(a) is affirmed.

The rejection of claims 35-40, 72-112, 118, 120, 121, 125, 127, 129, 133, 141, and 146 under 35 U.S.C. § 103(a) is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

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